On the Lowstand System Tracts (LSTs) as paleobathymetric indicators

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Lowstand Systems Tracts (LSTs), formed in the transitional area between the continental shelf and upper slope during the sea level stillstand of the Last Glacial Maximum (LGM), were used to measure the magnitude and rate of Late Pleistocene-Holocene vertical tectonic movements (Casalbore et al., 2017; Fraccascia et al., 2013; Pepe et al., 2014). A literature review shows that different empirical methods have been used to derive the paleo depth of LSTs' formation. Consequently, the amount and rate of vertical movements calculated for different areas are not comparable.

Here, we present the first results of a quantitative analysis of oceanographic and geologic data to estimate the position of the paleo-sea level related to the depth of the LST. The dataset consists of high-resolution reflection seismic profiles, storm wave parameters (e.g., significant wave height, wave period) and grain-size data.

The comparison between the theoretical beach equilibrium profile, derived from the Bruun's method (Bruun, 1954), and the upper bounding surface of LST recognized in the seismic profile provides a depth of about 135 m of the paleo-sea level during the formation of the LST. The obtained value of the paleo-sea level combined with the depth of closure fits with the seaward limit of the active beach profile observed along the seismic section.

The results of the quantitative analysis integrated with the Holocene sea-level curves are used to derive the post-LGM vertical tectonic movements along the upper slope of the Southern Tyrrhenian Sea. The present study also provides a vertical tectonic movements chart of the southern Tyrrhenian Sea in the late Quaternary.

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